

## ***Akysis pulvinatus*, a new species of catfish (Siluriformes: Akysidae) from southern Thailand**

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### **Abstract**

*Akysis pulvinatus*, new species, is described from southern Thailand. It can be distinguished from congeners in having a combination of: length of adipose-fin base 23.0–25.2% SL, body depth at anus 13.2–16.0% SL, caudal peduncle depth 9.4–10.3% SL, head length 27.6–29.8% SL, head width 21.9–25.1% SL, length of nasal barbel 13.9–57.5% HL, length of maxillary barbel 78.5–105.0% HL, smooth posterior edge of pectoral spine, gently forked caudal fin with lower lobe longer than upper, yellow snout, and rounded pale colored patches on body. A possible case of Müllerian mimicry with the syntopic *Pseudobagarius leucorhynchus* is mentioned and briefly discussed.

**Key words:** Siluriformes, Akysidae, catfish, *Akysis*, new species

### **Introduction**

*Akysis* species are diagnosed by the anterior margin of the pectoral spine with a notch visible dorsally and the nasals with expansions beyond the canal-bearing region (de Pinna, 1996). Externally, they can be distinguished by a combination of tuberculate skin, small size (typically under 50 mm SL), and a color pattern typically consisting of yellow patches or bands on a brown body. The genus is found in fast flowing streams and rivers in Southeast Asia, more specifically in the area bordered by the Irrawaddy River drainage to the west, the Mekong delta to the east, the Lancanjiang (upper Mekong) drainage to the north and the Citarum River drainage to the south. There is considerable hidden diversity within the genus, with more than half of the 17 valid species described within the last decade (Ferraris, 2007; Page *et al.*, 2007).

Recently, specimens of *Akysis* collected from southern Thailand were made available to me. These specimens closely resemble (and were initially identified as) *Akysis vespa* Ng & Kottelat, 2004 from southern Myanmar, but close examination revealed enough differences to warrant its recognition as a distinct species. The description of this new species as *Akysis pulvinatus* forms the basis of this study.

### **Material and methods**

Measurements were made point-to-point with dial calipers and recorded to 0.1 mm. Ng & Kottelat (1998) are followed for all measurements and counts. Examined material is in the following collections: Natural History Museum, London (BMNH); California Academy of Sciences, San Francisco (CAS); collection of Maurice Kottelat, Cornol (CMK); Naturhistoriska Riksmuseet, Stockholm (NRM); University of Michigan Museum of Zoology, Ann Arbor (UMMZ); National Museum of Natural History, Washington DC (USNM); Zoological Reference Collection, Raffles Museum of Biodiversity Research, Singapore (ZRC); Zoological Survey of India, Calcutta (ZSI).



**FIGURE 1.** *Akysis pulvinatus*, UMMZ 248249, holotype, 29.6 mm SL; Thailand: Ranong province.

*Akysis pulvinatus*, sp. nov.  
(Fig. 1)

**Type material.** Holotype: UMMZ 248249, 29.6 mm SL; Thailand; Ranong province, stream draining into Andaman Sea upstream of Kapoe, 9°34'14.0"N 98°41'40.4"E; J. Bohlen & V. Šlechtová, 5 April 2007.

Paratypes: UMMZ 245696, 26.5 mm SL; Thailand: Ranong province, Baan Na district, hillstreams flowing from Langkatuek, Klong Naka; K. Udomritthiruj, July 2005. UMMZ 248250 (2), 22.8–23.9 mm SL; Thailand: Phang Nga province, Tapi River drainage, Khlong Sok at Khao Sok canoe point, ca 5 km upstream of 'fish cave', 8°52'45.8"N 98°41'19.4"E; J. Bohlen & V. Šlechtová, 5 April 2007. ZRC 51009 (3), 21.7–26.6 mm SL; data as for holotype.

**Diagnosis.** *Akysis pulvinatus* is distinguished from congeners (except for *A. brachybarbatus*, *A. fuliginatus*, *A. longifilis*, *A. pictus*, *A. prashadi* and *A. vespa*) in lacking serrations on the posterior edge of the pectoral spine. It is distinguished from *A. brachybarbatus* in having a deeper caudal peduncle (9.4–10.3% SL vs. 7.9–8.1), narrower head (21.9–25.1% SL vs. 25.5–28.0) and the presence (vs. absence) of a yellow snout, from *A. fuliginatus* in having a longer adipose-fin base (23.0–25.2% SL vs. 15.1–19.5), a gently forked (vs. truncate) caudal fin, and presence (vs. absence) of light-colored markings on the head and body, and from *A. longifilis* in having a deeper body and caudal peduncle (depth 13.2–16.0% SL vs. 9.7–13.6 and 9.4–10.3% SL vs. 5.6–7.2 respectively), and shorter nasal and maxillary barbels (reaching posterior margin of orbit vs. dorsalmost limit of gill opening, 13.9–57.5% HL vs. 67.4–96.4, and reaching middle of pectoral-fin base vs. vertical through middle of dorsal-fin base, 78.5–105.0% HL vs. 123.2–159.6 respectively). *Akysis pulvinatus* differs from *A. pictus* and *A. prashadi* in having a longer head (27.6–29.8% SL vs. 20.9–25.1) and the presence (vs. absence) of a yellow snout. It is further distinguished from *A. pictus* in having more rounded pale colored patches on the body (vs. with elongate pale patches that typically extend throughout the dorsal surface of the entire postdorsal distance). *Akysis pulvinatus* most closely resembles *A. vespa* in color pattern, but differs from it in having a longer adipose-fin base (23.0–25.2% SL vs. 16.2–21.6), deeper caudal peduncle (9.4–10.3% SL vs. 7.6–9.1) and caudal fin with lower lobe longer than upper (vs. both lobes approximately equal). Some specimens of *A. varius* also lack serrations on the posterior edge of the pectoral spine, but *A. pulvinatus* is easily distinguished from it in having a gently forked (vs. truncate) caudal fin.

**Description.** Biometric data in Table 1. Body moderately compressed. Dorsal profile rising evenly but not steeply from tip of snout to origin of dorsal fin, then sloping gently ventrally to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Skin tuberculate. Lateral line incomplete, ending at vertical through pelvic-fin base. Vertebrae 14+17=31 (1).

Head depressed and broad, triangular when viewed laterally and with rounded snout margin when viewed from above. Anterior nostril tubular, base of nostril not in contact with base of nasal barbel. Gill openings narrow, extending from immediately ventral to posttemporal to one-third of distance from ventral midline of body to base of pectoral spine. Branchiostegal rays 6 (2). Gill rakers on first arch 2+8 (1) or 2+9 (1). Bony elements of dorsal surface of head covered with thick, tuberculate skin. Eye subcutaneous, ovoid, horizontal axis longest; located entirely in dorsal half of head.

Barbels in four pairs. Maxillary barbel long and slender, extending to middle of pectoral-fin base. Nasal barbel slender, extending just beyond posterior orbital margin. Inner mandibular-barbel origin close to midline, extending almost to vertical through base of pectoral spine. Outer mandibular barbel originates posterolateral of inner mandibular barbel, extending to middle of pectoral-fin base.

Mouth subterminal, premaxillary tooth band not exposed when mouth is closed. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rounded, of equal width throughout. Dentary tooth band much narrower than premaxillary tooth band at symphysis, tapering laterally.

Dorsal fin located above anterior third of body, with I,4,i (7) rays; fin margin convex; spine short and straight. Adipose fin with anterior margin concave and posterior margin angular. Caudal fin gently forked, with lower lobe longer than upper and i,6,6,i (7) principal rays. Procurrent rays symmetrical and extending only slightly anterior to fin base. Anal-fin base ventral to adipose-fin origin. Anal fin with convex margin and iii,6 (4), iii,6,i\* (2) or iv,6 (1) rays. Pelvic-fin origin at vertical through posterior end of dorsal-fin base. Pelvic fin with slightly convex margin and i,5 (7) rays; tip of adpressed fin just reaching anal-fin origin. Pectoral fin

with I,7 (3) or I,7,i\* (4) rays; fin margin posteriorly convex; anterior spine margin smooth, posterior margin without serrations.

**Coloration.** In ethanol: dorsal surface and sides of head and body chocolate brown, with anterior and posterior nostrils rimmed with yellow. Snout with yellow extending to anterior edge of anterior nostrils. Belly, chest and ventral surfaces of head and body yellow. Dorsal half of body with two almost round, saddle-shaped yellow spots: first on sides of body between dorsal and adipose fins, second more elongate and between posterior end of adipose-fin base and caudal flexure. Ventral half of body with two similar saddle-shaped, yellow spots: first between anal and pelvic fins and second between posterior base of anal fin and caudal flexure. Posterior dorsal and ventral spots separate in some individuals, partially coalescent in others. Proximal two thirds of dorsal fin chocolate brown, remaining third hyaline with scattered chocolate brown spots. Anal and pelvic fins hyaline with very few chocolate brown spots. Proximal one-third of pectoral fin with faint brown band formed by scattered melanophores; rest of fin hyaline. Caudal fin chocolate brown with distal one-third of both upper and lower lobes with large hyaline spot. Adipose fin chocolate brown, with yellow blotches on anterior, posterior and dorsal margins. Barbels dark yellow with brown rings. Live coloration similar, but with darker yellow color in pale regions of head and body (Fig. 2).

**TABLE 1.** Biometric data for *Akysis pulvinatus* (n=7). Mean and SD values are inclusive of the holotype.

Biometrics	Holotype	Range	MeanSD
In % SL			
Predorsal distance	37.5	35.0–38.9	37.21.4
Preanal length	65.2	63.9–65.2	64.80.5
Prepelvic length	47.3	46.0–47.5	47.10.6
Prepectoral length	23.6	22.3–23.6	22.70.5
Length of dorsal-fin base	15.9	15.6–16.9	16.10.5
Length of dorsal spine	15.2	15.2–16.9	16.10.8
Length of anal-fin base	14.2	14.2–17.0	15.91.1
Length of pelvic fin	13.5	12.8–14.3	13.70.6
Length of pectoral fin	22.3	22.3–26.7	24.81.7
Length of pectoral spine	16.6	16.6–19.2	17.61.0
Length of caudal fin	22.0	22.0–24.4	23.01.0
Length of adipose-fin base	25.0	23.0–25.2	24.20.9
Body depth at anus	14.5	13.2–16.0	14.71.0
Depth of caudal peduncle	10.1	9.4–10.3	9.90.4
Length of caudal peduncle	21.6	18.5–21.6	20.41.2
Head length	28.7	27.6–29.8	28.40.9
Head width	23.6	21.9–25.1	23.81.3
Head depth	17.6	13.2–17.6	16.31.8
In % HL			
Snout length	32.9	32.9–40.0	35.72.9
Interorbital distance	31.8	31.6–38.7	35.43.5
Eye diameter	12.9	8.9–13.7	11.81.8
Length of nasal barbel	36.5	13.9–57.5	41.219.1
Length of maxillary barbel	82.4	78.5–105.0	89.410.2
Length of inner mandibular barbel	52.9	45.6–60.0	54.55.7
Length of outer mandibular barbel	80.0	69.6–92.0	80.27.9



**Distribution.** Known only from the upper Tapi River drainage and hillstreams flowing into the Andaman Sea on the western half of the Isthmus of Kra (Fig. 3).

**Habitat.** The type locality of *A. pulvinatus* is a stream with both slow-flowing (8 m wide) and riffle (5 m wide) areas (Fig. 4). The substrate consisted of gravel and larger rocks, with the catfish being found between the rocks, particularly in the riffle areas. The water was clear, with a temperature of 29.3°C and a pH of 8. Other fish species collected at this locality include: *Homaloptera smithi*, *Schistura* sp., *S. robertsi*, *Hara* sp. and *Mastacembelus armatus*.

**Etymology.** From the Latin noun *pulvinus*, meaning an elevation; in reference to the long-based adipose fin of this species.



FIGURE 2. *Akysis pulvinatus*, UMMZ 245696, paratype, 26.5 mm SL, showing live coloration.

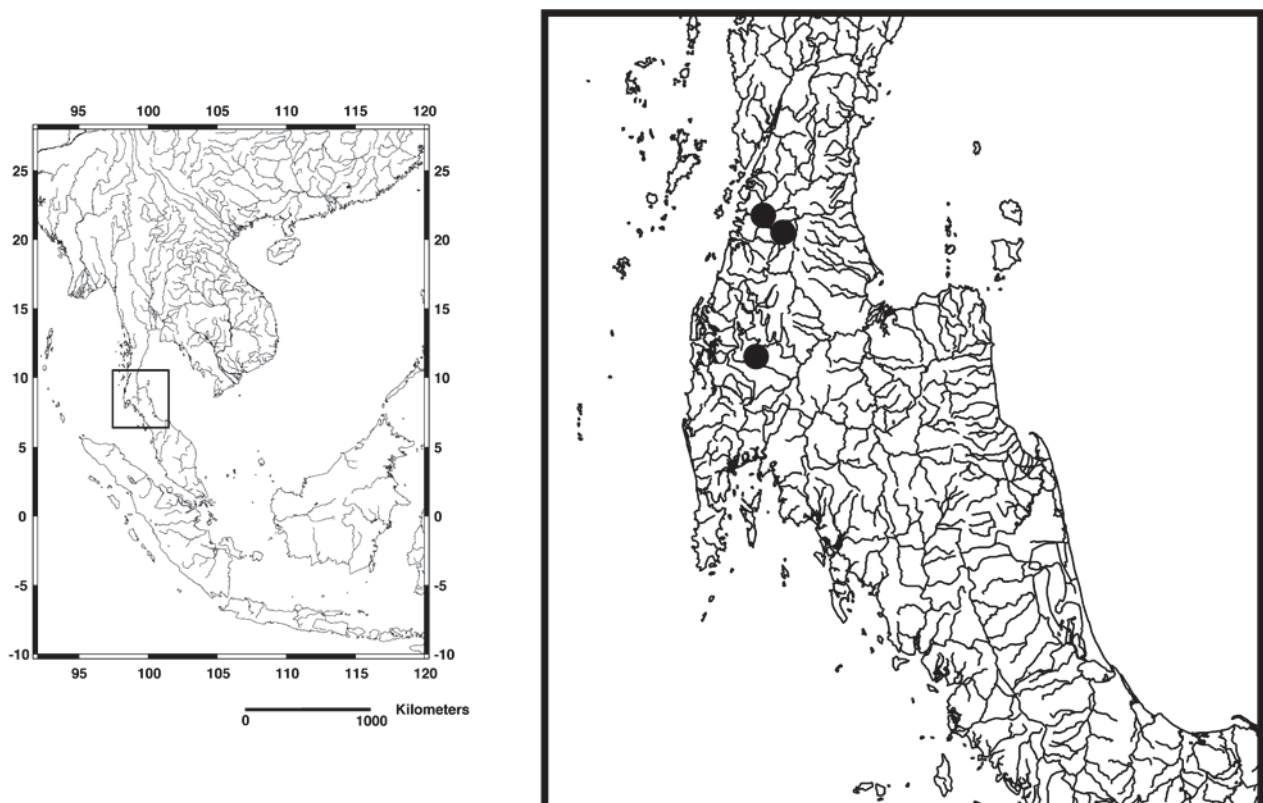


FIGURE 3. Collection localities for *Akysis pulvinatus*.



**FIGURE 4.** Type locality of *Akysis pulvinatus*. Photograph courtesy of Vendula Šlechtová.

## Discussion

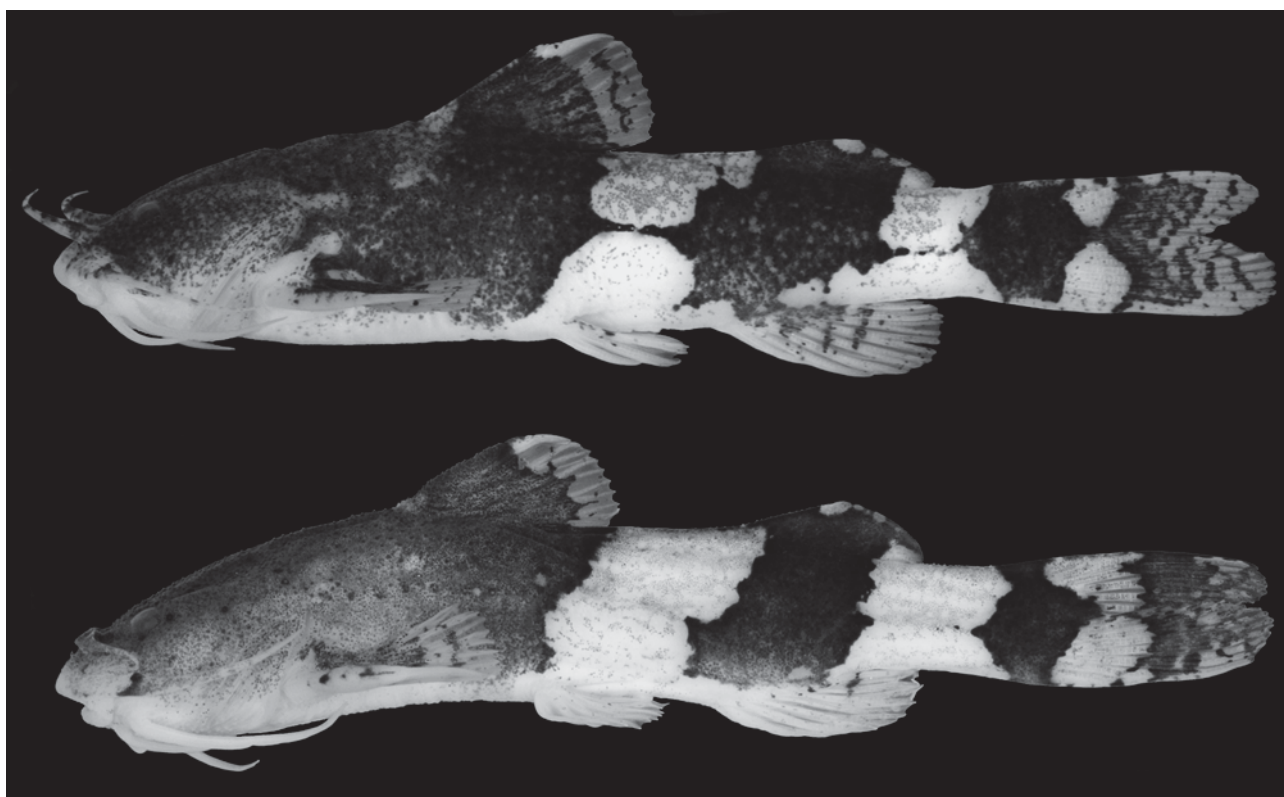
*Akysis pulvinatus* superficially resembles *A. vespa* very closely, but differs considerably from it in several respects, viz. the longer adipose-fin base and deeper caudal peduncle, which are evident when the two species are compared side by side (Fig. 5). Additionally, there are slight differences in the color pattern of the two species. In the *A. pulvinatus* examined, the yellow dorsal and ventral spots between the dorsal and adipose fins frequently do not coalesce into a distinct yellow band (there is frequently a very thin region along the lateral myoseptum that the spots do not overlap; Fig. 5) and even when they do, the outlines of the component spots are still faintly evident (in the form of a thin broken brown line in the region where the spots coalesce), while in all material of *A. vespa* examined, this feature assumes the form of an oblique irregular band, without clear indication that it is formed from the coalescence of two spots (Fig. 5). Since there is not enough material of *A. pulvinatus* to determine the full extent of color variation in this species, this difference is noted, but not used as a diagnostic character.

*Akysis pulvinatus* is sometimes found syntopically with *Pseudobagarius leucorhynchus*, another akysid catfish that shares with it a pattern of bold yellow and brown bands on the head and body. The striped pattern has been hypothesized to be a form of aposematic coloration used in Batesian mimicry in *A. vespa* (model) and *Caelatoglanis zonatus* (mimic) by Ng & Kottelat (2005). In this case, both *A. pulvinatus* and *P. leucorhynchus*, like other akysids (de Pinna, 1996), possess a venom apparatus associated with the dorsal- and pectoral-fin spines. The possibility exists that the bold, striped coloration of the two catfish serves as aposematic coloration used in Müllerian mimicry. However, this hypothesis awaits further testing in the absence of field data.

*Akysis pulvinatus* is known from the western half of the Isthmus of Kra, an area where the freshwater fish fauna is not well known. The freshwater fish fauna of this region is traditionally thought to be identical to that



of the rest of the Malay Peninsula (Kottelat, 1989). Recent collections from this region (the western half of which includes the southern tip of the Tenasserim range) have suggested otherwise, also yielding an undescribed species of *Hara* (currently being described in another study; Ng & Kottelat, 2007). Considerable endemism may exist in this region and more comprehensive surveys are needed.



**FIGURE 5.** Lateral views of: a. *Akysis pulvinatus*, UMMZ 248249, holotype, 29.6 mm SL; b. *A. vespa*, ZRC 49155, paratype, 28.9 mm SL.

### Comparative material

*Akysis brachybarbatus*: CMK 5667 (2 paratypes), 33.2–34.1 mm SL; China: Yunnan, Menlian county.

*A. fuliginatus*: UMMZ 241338 (holotype), 21.5 mm SL; UMMZ 235691 (2 paratypes), 19.1–19.9 mm SL; Cambodia: Stung Treng province, Mekong River on W edge of Kaoh Han, 16 km NE of Stung Treng, 13°38'N 106°3'E,

*A. longifilis*: UMMZ 246172 (holotype), 33.8 mm SL; UMMZ 245966 (7 paratypes), 31.5–53.1 mm SL; UF 161587 (2 paratypes), 33.7–34.0 mm SL; Myanmar: Bago division, Pyu township, Pyu stream (tributary of Sittang River) ca. 229 km from Yangon, 18°29'N 96°26'E

*A. pictus*: BMNH 1880.12.1.25-26 (2 syntypes), 37.7–42.4 mm SL; Myanmar: Tenasserim.

*A. prashadi*: ZSI F10873/1 (holotype), 38.3 mm SL; Myanmar: Myitkyina district, S end of Lake Indawgyi and along W shore near Lonton village. CAS 98615 (1), 62.1 mm SL; Myanmar: Sagaing division, Kalemmyo markets. CAS 98616 (3), 20.8–50.4 mm SL; Myanmar: Kachin State, Ayeryawaddy River, just S of Myitkyina. NRM 41051 (1), 45.5 mm SL; Myanmar: Kachin State, Nant Yen Khan Cheng, effluent of Lake Indawgyi, upstream of road near Lonton village. UMMZ 245488 (16), 35.7–44.6 mm SL; Myanmar: Kachin State, Myitkyina district, hillstreams at Tonpan village, on road from Myitkyina to Tanai.

*A. varius*: ZRC 41015 (holotype), 30.8 mm SL; CMK 12609, 1 paratype, 23.0 mm SL; Laos: Khammouan province, Xe Bangfai about 3 km upriver of Ban Pakphanang. CMK 12433 (6 paratypes), 13.5–21.7 mm SL;

Laos: Khammouan province, Xe Bangfai, rapids about 2 km upriver of Ban Pungxe. UMMZ 214913 (2 paratypes), 20.4–20.6 mm SL; Thailand: Ubon Ratchathani province, Khong Chiam district, Huay Kwang, 1.5 km upstream from Mun River. USNM 232390 (7 paratypes), 16.2–20.7 mm SL; Thailand: Nakhon Ratchasima province, Lam Nam Mun, about 1 km below dam and 2 km downstream from Phima.

*A. vespa*: ZRC 46423 (holotype), 30.0 mm SL; CMK 17788 (8 paratypes), 15.7–31.4 mm SL; CMK 17953 (5 paratypes), 16.7–20.9 mm SL; CMK 17977 (5 paratypes); ZRC 49155 (4 paratypes), 16.4–28.9 mm SL Myanmar: Kayin State, stream “Chon Son” between Kyondaw and Phadaw, about 20 km NW of Payathouzu (at border with Thailand), 15°25'N 98°15'E.

## Acknowledgments

I am grateful to Kamphol Udomritthiruj for help in obtaining the material of *A. pulvinatus*, Jörg Bohlen for providing additional material of *A. pulvinatus* and information on its type locality, Vendula Šlechtová for permission to use the picture in Fig. 4, and the following for permission to examine material under their care: James Maclaine (BMNH), David Catania (CAS), Maurice Kottelat (CMK), Sven Kullander (NRM), Susan Jewett (USNM), Kelvin Lim (ZRC) and A. K. Karmakar (ZSI). Funding for this project has been provided by the All Catfish Species Inventory (NSF DEB-0315963).

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